

WHAT IS CLAIMED IS:

1           1.       A seat belt device for protecting the occupant of a vehicle comprising:

2                   a tongue fitting having an eyelet formed therein, said tongue fitting adapted to  
3                   be received by a seat belt buckle attached to said vehicle;

4                   a seat belt retractor attached to said vehicle;

5                   a seat belt comprising a flexible fabric tube having a first end attached to said  
6                   vehicle, a second end attached to said seat belt retractor, and a medial portion passing  
7                   through said eyelet formed in said tongue fitting, said seat belt forming a three point  
8                   restraint including a lap portion extending from said fixed end to said tongue fitting  
9                   and a torso portion extending from said tongue portion toward said seat belt retractor;

10                  an inflatable air bag member disposed within said seat belt, said inflatable air  
11                  bag member extending within said seat belt from a first end proximal said fixed of said  
12                  seat belt end to a second end within said torso portion of said seat belt;

13                  a reinforcing sleeve, said reinforcing sleeve comprising a flexible fabric sleeve  
14                  having a closed end and an open end, said reinforcing sleeve forming an annular layer  
15                  between said inflatable air bag member and said flexible fabric sleeve, said reinforcing  
16                  sleeve extending from said closed end proximal said first end of said inflatable air bag  
17                  member to said open end within said torso portion of said seat belt; and

18                  an inflator fluidly connected with said inflatable air bag member for providing  
19                  a source of pressurized gas for inflating said inflatable air bag member.

1           2.       The seat belt device of claim 1, wherein:

2           said flexible fabric tube includes a longitudinal seam adapted to rupture as said  
3   inflatable air bag member inflates.

1   3.       The seat belt device of claim 1, wherein:

2           said reinforcing sleeve comprises a stress concentration at said open end, said stress  
3   concentration being capable of initiating a tear in said reinforcing sleeve that propagates  
4   toward said eyelet as said inflatable air bag is inflated.

1   4.       The seat belt device of claim 3, wherein:

2           said stress concentration comprises a notch cut into said reinforcing sleeve intersecting  
3   said open end of said reinforcing sleeve.

1   5.       The seat belt device of claim 1, wherein:

2           said reinforcing sleeve comprises a fabric having a denier of no greater than 1000 x  
3   1000.

1   6.       The seat belt device of claim 1, wherein:

2           said reinforcing sleeve comprises a fabric having a denier of no greater than 500.

1   7.       The seat belt device of claim 1, wherein:

2           said inflatable air bag member comprises a fabric tube that, in an un-inflated condition  
3   assumes the shape of a flat belt having a first and a second lateral edge, said fabric tube being  
4   folded into a rooster-tail fold comprising a plurality of pleats along said first lateral edge and a  
5   single apex along said second lateral edge.

1 8. A seat belt airbag comprising:

2 an inner layer comprising a inflatable air bag member, said inflatable air bag member  
3 comprising a elongate tubular member that, in an un-inflated condition assumes the shape of a  
4 flat belt having a first and a second lateral edge and a first and a second end, said elongate  
5 tubular member tube being folded into a rooster-tail fold comprising a plurality of pleats along  
6 said first lateral edge and a single apex along said second lateral edge, said inflatable air bag  
7 member being adapted to deploy under an inflation pressure;

8 a middle layer comprising a reinforcing sleeve surrounding said inflatable air bag  
9 member and extending from said first end of said inflatable air bag member to a point medial  
10 of said first and second ends of said inflatable air bag member, said middle layer comprising a  
11 flexible fabric tube having sufficient strength to contain said inflatable air bag member under  
12 said inflation pressure; and

13 an outer layer comprising a flexible fabric tube surrounding said inflatable air bag  
14 member and said reinforcing sleeve, said outer layer having a longitudinal weakened seam  
15 such that said outer layer is incapable of containing said inflatable air bag member under said  
16 inflation pressure.

1 9. The seat belt device of claim 8, wherein:

2 said reinforcing sleeve comprises a stress concentration at said open end, said stress  
3 concentration being capable of initiating a tear in said reinforcing sleeve that propagates  
4 toward said eyelet as said inflatable air bag is inflated.

1 10. The seat belt device of claim 9, wherein:

2        said stress concentration comprises a notch cut into said reinforcing sleeve intersecting  
3    said open end of said reinforcing sleeve.

1    11.    The seat belt device of claim 8, wherein:

2        said reinforcing sleeve comprises a fabric having a denier of no greater than 1000 x  
3    1000.

1    12.    The seat belt device of claim 8, wherein:

2        said reinforcing sleeve comprises a fabric having a denier of no greater than 500.